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10/776,203	02/12/2004	Rajiv Yadav Ranjan	50103-553	2760

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EXAMINER	
MCDONALD, RODNEY GLENN	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/776,203	RANJAN ET AL.	
	Examiner	Art Unit	
	Rodney G. McDonald	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6,7,11-13,15-17,20,21,23-25 and 27-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6,7,11-13,15-17,20,21,23-25 and 27-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 24, 27, 28, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama et al. (Japan 2000-057640) in view of Brors (U.S. Pat. 4,169,031) and Kobayashi et al. (Japan 56-152963).

Regarding claims 1, 24, Akiyama et al. teach a cathode sputtering apparatus (Fig. 1) for forming a uniform thickness layer of a selected material on at least one workpiece in a multi-stage process comprising depositing a plurality of sub-layers. A first group of spaced-apart cathode target assemblies (i.e. chambers 2, 3) comprising annular-shaped magnetron magnet assemblies (i.e. magnet diameter of 160 mm and

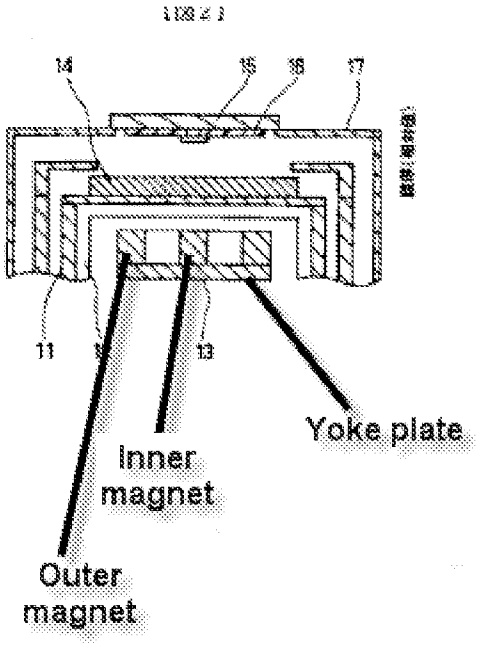
200 mm). A transportation unit for transporting at least one workpiece past each target assembly of the first group of target assemblies for deposition of a first plurality of sub-layers on a first surface of the at least one workpiece. (i.e. conveyance device for inline processing) Each target assembly of the first group of target assemblies comprises a sputtering surface oriented substantially parallel to the first surface of the at least one substrate. The first group of target assemblies adapted to provide sublayers with different sputtered film thickness profiles, such that the first plurality of sub-layers collectively form the uniform thickness layer of the selected material (i.e. thickness distribution suppressed to 5%). The annular-shaped magnetron magnet assemblies having progressively increasing diameters. (See Abstract; Machine Translation 0020; Machine Translation 0025; Machine Translation 0036) The size of the magnets are either decreased from largest to smallest or increased from smaller to largest. (Machine Translation 0025, 0036 respectively)

Regarding claims 27, 28, Akiyama et al. teach the outer diameter of the magnetron magnet to be 200 mm and 120 mm respectively. It would follow that the inner diameters would be less than 200 mm and less than 120 mm because of the showing in Fig. 2. (See Abstract; Fig. 2)

Regarding claims 31 and 32, Akiyama et al. teach the outer diameter of the magnetron magnet to be 200 mm and 120 mm respectively. It would follow that the inner diameters would be less than 200 mm and less than 120 mm because of the showing in Fig. 2. (See Abstract; Fig. 2)

The differences between Akiyama et al. and the present claims is that the shape of the annular magnetron assemblies is not discussed and a distance between each sputtering surface and the at least one substrate/workpiece is progressively larger is not discussed.

Akiyama teach in Fig. 2 an annular shaped magnetron assembly. From Figure 2 it appears that there is an outer ring shaped magnet and an inner magnet on a disk yoke. See annotated Figure 2 below.



Furthermore, Brors teach an assembly for magnetron sputtering where a centrally disposed cylindrical permanent magnet 31 is centrally disposed coaxially of the outer permanent magnet 29. A disc shaped magnetic yoke 32 is disposed. (Column 3 lines 1-7; Figs. 1, 2)

The motivation for utilizing the features of Brors is that it allows enhancing the intensity of the glow discharge on the surface of the target thereby improving sputtering rate. (Column 1 lines 10-12)

Regarding a distance between each sputtering surface and the at least one substrate/workpiece is progressively larger, Kobayashi et al. teach changing the distance between the substrate and the electrode in order to from more uniform films. (See Kobayashi et al. Abstract)

The motivation for utilizing the features of Kobayashi et al. is that it allows for forming more uniform films. (See Kobayashi et al. Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Akiyama et al. by utilizing the features of Brors and Kobayashi et al. because it allows for enhancing the intensity of the glow discharge on the surface of the target thereby improving sputtering rate and for forming more uniform films.

Claims 1-4, 6, 7, 11, 13, 15-17, 20, 24, 25, 27, 28, 29, 30, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama et al. (Japan 2000-057640) in view of Brors (U.S. Pat. 4,169,031) and further in view of Hedgcoth (U.S. Pat. 4,894,133) and Kobayashi et al. (Japan 56-152963).

Akiyama et al. in view of Brors is discussed above and all is as applies above. (See Akiyama et al. in view of Brors discussed above) Akiyama et al. in view of Brors applies to claims 1, 13 and 24. (See Akiyama et al. discussed above)

The differences not yet discussed is that rearranging the order of the magnets is not discussed (Claims 1, 13), a distance between each sputtering surface and the at least one substrate/workpeice being progressively larger is not discussed (Claims 1, 24), the sputtering surfaces of at least one cathode/target assembly of the first and second group of cathode/target assemblies located at different spacing from the first and second surfaces of the at least one substrate/ workpiece than another of the cathode/target assemblies is not discussed (Claim 13), a second set of targets to coat a second side of the substrate is not discussed (Claims 2, 13, 25), the cathode targets being in substantial vertical registry is not discussed (Claim 3, 15), the cathode/target assemblies of the first and second groups of cathode/target assemblies located within a single vacuum chamber is not discussed (Claim 4), the cathode/target assemblies of said first and second groups of cathode/target assemblies form an in-line or a circular-shaped arrangement within said vacuum chamber is not discussed (Claims 5, 16), the cathode/target assemblies of said first and second groups of cathode/target assemblies are located in a plurality of vacuum chambers is not discussed (Claims 6, 17), the plurality of vacuum chambers forming an in-line or a circularly-shaped arrangement of chambers is not discussed (Claim 7), each cathode/target assembly of said first and second groups of cathode/target assemblies is a planar magnetron cathode/target assembly including a magnetron magnet means is not discussed (Claims 8, 18), the magnetron magnet means of at least some of the planar magnetron cathode/target assemblies are of different lengths, widths or diameters is not discussed (Claims 9) and the means for transporting the at least one substrate/workpiece past the first and

second groups of cathode/target assemblies for deposition of the first, second pluralities of sub-layers comprises means for mounting and transporting at least one disk-shaped substrate/workpiece is not discussed (Claims 11, 20), forming perpendicular magnetic recording medium is not discussed (Claim 13) and the inner and outer diameter of the magnets are not discussed (Claims 29, 30).

Regarding claims 1, 13, As to reversing the order of the magnets it appears to the Examiner that Akiyama does suggest utilizing a smaller magnet than a larger magnet (See paragraph 0036) But however it would be obvious to reverse the sequence in the case where a larger magnet and then a smaller magnet is utilized (as seen in Machine Translation 0025) because in both instances a uniform total film will result. See Ex parte Rubin , 128 USPQ 440 (Bd. App. 1959) (Prior art reference disclosing a process of making a laminated sheet wherein a base sheet is first coated with a metallic film and thereafter impregnated with a thermosetting material was held to render prima facie obvious claims directed to a process of making a laminated sheet by reversing the order of the prior art process steps.). See also In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946) (selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results); In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930) (Selection of any order of mixing ingredients is prima facie obvious.)

Regarding a distance between each sputtering surface and the at least one substrate/workpeice being progressively larger (Claims 1, 24), Kobayashi et al. teach

changing the distance between the substrate and the electrode in order to from more uniform films. (See Kobayashi et al. Abstract)

The motivation for utilizing the features of Kobayashi et al. is that it allows for forming more uniform films. (See Kobayashi et al. Abstract)

Regarding the sputtering surfaces of at least one cathode/target assembly of the first and second group of cathode/target assemblies located at different spacing from the first and second surfaces of the at least one substrate/ workpiece than another of the cathode/target assemblies (Claim 13), Kobayashi et al. teach changing the distance between the substrate and the electrode in order to from more uniform films. (See Kobayashi et al. Abstract)

The motivation for utilizing the features of Kobayashi et al. is that it allows for forming more uniform films. (See Kobayashi et al. Abstract)

Regarding claims 2, 13, 25, Hedgcoth teach providing targets to coat both sides of a substrate. (See Fig. 1; Column 4 lines 31-35)

Regarding claim 3, Hedgcoth suggest locating target in vertical registry for an in-line apparatus. (See Figs. 1 and 2)

Regarding claim 4, Hedgcoth locating targets 42 in a single vacuum chamber. (See Figs. 1 and 2)

Regarding claim 6, Hedgcoth suggest locating targets 42 and 44 in different vacuum chambers. (See Figs. 1 and 2; Column 4 lines 7-8)

Regarding claim 7, Hedgcoth suggest the plurality of vacuum chamber arranged in-line. (See Figs. 1 and 2)

Regarding claim 11, Hedgcoth suggest means 6 for transporting and mounting at least one disk shaped workpiece. (Column 4 line 4; Fig. 2)

Regarding claim 13, Hedgcoth teach forming perpendicular magnetic recording medium. (Column 4 lines 56-57) It follows that to make a uniform layer one would use the teachings of Akiyama et al. when sputtering depositing layers such as when Hedgcoth sputters the magnetic recording layer.

Regarding claim 15, Hedgcoth suggest locating target in vertical registry. (See Figs. 1 and 2) Hedgcoth teach forming coatings on each of the first and second surface simultaneously. (See Figs. 1, 2)

Regarding claim 16, Hedgcoth suggest an in-line arrangement. (See Figs. 1 and 2)

Regarding claim 17, Hedgcoth suggest the plurality of vacuum chambers arranged in-line. (See Figs. 1 and 2)

Regarding claim 18, Hedgcoth suggest that the targets should be magnetron targets. (Column 4 lines 33-35; Column 4 lines 52-55)

Regarding claim 20, Hedgcoth suggest means 6 for transporting and mounting at least one disk shaped workpiece. (Column 4 line 4; Fig. 2)

The motivation for utilizing the features of Hedgcoth is that it allows for producing magnetic disks. (See Abstract)

Regarding claims 29, 30, Akiyama et al. teach the outer diameter of the magnetron magnet to be 200 mm and 120 mm respectively. It would follow that the

inner diameters would be less than 200 mm and less than 120 mm because of the showing in Fig. 2. (See Abstract; Fig. 2)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Akiyama et al. by utilizing the features of Brors, Hedgcoth and Kobayashi et al. because it allows for enhancing the intensity of the glow discharge on the surface of the target thereby improving sputtering rate, it allows for producing magnetic disks and allows for improving the uniformity of the films.

Claims 12, 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama et al. in view of Brors and further in view of Hedgcoth and Kobayashi et al. as applied to claims 1-4, 6, 7, 11, 13, 15-17, 20, 24, 25, 27, 28, 29, 30, 31 and 32 above, and further in view of Mukai et al. (U.S. Pat. 5,441,615).

The difference not yet discussed is the use of shield members. (Claims 12, 21)

Regarding claims 12, 21, Mukai et al. teach utilizing deposition shield members for targets. (Column 3 lines 30-32)

The motivation for utilizing the features of Mukai et al. is that it allows for preventing sputtered particles from dispersing to the outside of the deposition shield members. (Column 2 lines 61-65)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Mukai et al. because it allows for preventing sputtered particles from dispersing to the outside of the deposition shield members.

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Akiyama et al. in view of Brors and further in view of Hedgcoth as applied to claims 1-4, 6, 7, 11, 13, 15-17, 20, 24, 25, 27, 28, 29, 30, 31 and 32 above, and further in view of Nasu et al. (U.S. Pat. 5,326,637).

The difference not yet discussed is depositing a perpendicular magnetic recording medium on a magnetically soft underlayer and the magnetic soft underlayer being 500 to 4,000 Angstroms and being Fe or Fe-Co (claim 23).

Regarding claim 23, Nasu et al. teach depositing a magnetic recording medium by sputtering on a magnetically soft underlayer. (See Abstract) The magnetic soft underlayer can be Fe, Fe-Co. (See Abstract). The thickness can be 500 Angstroms. (Column 5 lines 28-35)

The motivation for utilizing the features of Nasu et al. is that it allows for producing a film with high recording density and reproduction output. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Nasu et al. because it allows for producing a film with high recording density and reproduction output.

Response to Arguments

Applicant's arguments filed February 4, 2009 have been fully considered but they are not persuasive.

Response to the arguments under 35 U.S.C. 103:

A. Akiyama in view of Brors and Kobayashi:

In response to the argument that the prior art does not teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters, and a distance between each sputtering surface and the at least one substrate/workpiece is progressively larger, it is argued that Akiyama teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters in order to deposit uniform films. (See Akiyama et al.; Akiyama et al. Machine Translation Paragraphs 0027, 0036) It is argued that Kobayashi teaches changing the distance between the target and the substrate in order to form more uniform films. This distance can be selected as either larger or smaller to optimize film thickness uniformity. (See Kobayashi discussed above) The motivation for applying the teachings of Kobayashi to Akiyama is that it allows deposition of uniform thin films. (See Akiyama and Kobayashi discussed above)

In response to the argument that Akiyama teach away from changing the distance between the sputtering surface and the at least one substrate/workpiece because Akiyama teach setting the distance between the targets and the substrates, it is agued that while Akiyama teach set target to substrate distances one of ordinary skill in the art would readily envisage changing those distances as taught by Kobayashi because one of ordinary skill in the art would look to improve film uniformity. (See Akiyama and Kobayashi discussed above)

In response to the argument that Kobayashi does not teach a configuration in which a distance between each sputtering surface and the at least one

substrate/workpiece is progressively larger, It is argued that Kobayashi teaches changing the distance between the target and the substrate in order to form more uniform films. This distance can be selected as either larger or smaller to optimize film thickness uniformity. (See Kobayashi discussed above)

In response to the argument that the currently claimed invention achieves unexpected results that achieve uniform thickness, it is argued that both Akiyama and Kobayashi teach achieving uniform films therefore the claims invention is obvious based on the combination of references.

B. Akiyama in view of Brors and Hedgcoth and Kobayashi:

In response to the argument that the prior art does not teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters, and a distance between each sputtering surface and the at least one substrate/workpiece is progressively larger, it is argued that Akiyama teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters in order to deposit uniform films. (See Akiyama et al.; Akiyama et al. Machine Translation Paragraphs 0027, 0036) It is argued that Kobayashi teaches changing the distance between the target and the substrate in order to form more uniform films. This distance can be selected as either larger or smaller to optimize film thickness uniformity. (See Kobayashi discussed above) The motivation for applying the teachings of Kobayashi to Akiyama is that it allows deposition of uniform thin films. (See Akiyama and Kobayashi discussed above)

In response to the argument that the prior art teach away from changing the distance between the sputtering surface and the at least one substrate/workpiece

because Akiyama teach setting the distance between the targets and the substrates, it is agued that while Akiyama teach set target to substrate distances one of ordinary skill in the art would readily envisage changing those distances as taught by Kobayashi because one of ordinary skill in the art would look to improve film uniformity. (See Akiyama and Kobayashi discussed above)

In response to the argument that Hedgcoth does not teach depositing perpendicular magnetic recording medium on a magnetic soft underlayer, it is argued that Hedgcoth teach depositing a perpendicular magnetic layer and that Nasu et al. teach that perpendicular magnetic recording medium can be deposited on a soft magnetic layer. (See Hedgcoth and Nasu et al. discussed above)

In response to the argument that Hedgcoth does not teach transporting at least one substrate for a perpendicular magnetic recording medium, it is argued that Hedgcoth teach transporting the substrates vertically to deposit magnetic layers thereon. (See Hedgcoth discussed above)

C. Akiyama in view of Brors and further in view of Hedgcoth and Kobayashi and further in view of Mukai:

In response to the argument that the prior art does not teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters, and a distance between each sputtering surface and the at least one substrate/workpiece is progressively larger, it is argued that Akiyama teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters in order to deposit uniform films. (See Akiyama et al.; Akiyama et al. Machine Translation Paragraphs 0027, 0036)

It is argued that Kobayashi teaches changing the distance between the target and the substrate in order to form more uniform films. This distance can be selected as either larger or smaller to optimize film thickness uniformity. (See Kobayashi discussed above) The motivation for applying the teachings of Kobayashi to Akiyama is that it allows deposition of uniform thin films. (See Akiyama and Kobayashi discussed above)

In response to the argument that the prior art teach away from changing the distance between the sputtering surface and the at least one substrate/workpiece because Akiyama teach setting the distance between the targets and the substrates, it is agued that while Akiyama teach set target to substrate distances one of ordinary skill in the art would readily envisage changing those distances as taught by Kobayashi because one of ordinary skill in the art would look to improve film uniformity. (See Akiyama and Kobayashi discussed above)

D. Akiyama in view of Brors and further in view of Hedgcoth:

In response to the argument that the prior art does not teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters, and a distance between each sputtering surface and the at least one substrate/workpiece is progressively larger, it is argued that Akiyama teach the annular-shaped magnetron magnet assemblies have progressively increasing diameters in order to deposit uniform films. (See Akiyama et al.; Akiyama et al. Machine Translation Paragraphs 0027, 0036) It is argued that Kobayashi teaches changing the distance between the target and the substrate in order to form more uniform films. This distance can be selected as either larger or smaller to optimize film thickness uniformity. (See Kobayashi discussed

above) The motivation for applying the teachings of Kobayashi to Akiyama is that it allows deposition of uniform thin films. (See Akiyama and Kobayashi discussed above)

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-Th with every Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rodney G. McDonald/
Primary Examiner, Art Unit 1795

Rodney G. McDonald
Primary Examiner
Art Unit 1795

RM
April 22, 2009